



# PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION

### Improvements in or relating to Apparatus for Detecting the Presence of Explosive or Toxic Gases

I, RALPH POOLE, British Subject, of 50, Bedford Square, London, W.C.1, do hereby declare the nature of this invention to be as follows:—

- 5 This invention relates to apparatus for detecting the presence of explosive or toxic gases, that is to say, of gases which when present in a sufficient proportion in a gas under investigation produce an explosive or dangerously toxic mixture, and of the kind comprising an electric circuit containing a detecting filament arranged to be exposed to the gas under investigation and to be maintained at a 10 temperature at which it has a catalytic action on the gas, a compensating filament and apparatus responsive to variation in the relative resistances of the two filaments resulting from variations in 15 the temperature of the detecting filament due to its catalytic action in the presence of explosive or toxic gas.

In such apparatus, the action of the compensating filament is to ensure as far 20 as possible that variations in the state of the gas under investigation, such as its humidity or temperature, shall not affect the operation of the apparatus and, if satisfactory results are to be ensured, it 25 is necessary that the detecting and compensating filaments be matched so that they will respond equally to changes in the condition of the gas other than changes in the proportion of explosive or 30 toxic gas therein.

It is therefore the practice to provide a filament unit carrying matched detecting and compensating filaments mounted in or on a single support which is 35 arranged to be inserted as a unit into the apparatus and to be replaced by a similar unit having matched filaments if and when a filament fails or otherwise requires renewal. One such arrangement 40 is described in the specification of the present applicant's British Patent No. 567,101.

(Price 2/-)

The matching of the filaments presents certain difficulties and a degree of selective assembly and even with this a perfect match is difficult to achieve, with the result that the normal present practice is to provide an approximate match within certain specified limits, the difficulty being increased by the fact that the 50 filaments cannot be identically the same, owing to the different functions which they perform.

The object of the present invention is to facilitate the provision of filament 60 units of the kind referred to and to enable units to be more readily provided in which the filaments are in effect substantially matched.

To this end, a filament unit for gas detecting apparatus of the kind referred to according to the present invention comprises a support carrying two filaments with appropriate terminals whereby the 65 filaments can be connected appropriately 70 into the circuit of the detecting apparatus as in known constructions, and an adjusting device on the support whereby the relative current flow through the two filaments can be adjusted, with means for 75 locking the adjusting device in its position of adjustment.

Thus, filaments which are not in themselves exactly matched can be in effect matched after assembly in the unit by 80 appropriate positioning of the adjusting device, which is then locked in position to prevent any further inadvertent or other adjustment.

Preferably the adjusting device com- 85 prises a potentiometer through which one end of each filament is connected to a common terminal on the unit. Thus, the unit may comprise substantially coaxial cylindrical end portions formed for example of insulating material and spaced apart by means of a spacing member or portion, with detecting and compensating filaments extending between 90

- the end portions, preferably with the spacing member or portion constituting a screen between them to prevent direct radiation of heat from one to the other,
- 5 a part annular electrical resistance surrounding one end portion with its ends connected respectively to the adjacent ends of the two filaments and a movable contact carried by or connected to a
- 10 stationary contact on that end portion and engaging the resistance. Conveniently, the stationary contact is centrally disposed on the cylindrical end portion of the unit and carries a movable contact in
- 15 the form of a rotatable arm pivoted thereto.
- In any case, the adjusting device is preferably locked in its position of adjustment by soldering or a similar permanent connection, for example by soldering the movable contact to the electrical resistance in the arrangement described above.

For this purpose, the movable contact, which would normally be of sheet metal, 25 may have a slot formed therein where it engages the electrical resistance to permit solder to be applied to the resistance through the slot.

Further, the cylindrical end portion of 30 the unit remote from the resistance may carry contacts, for example in the form of pins adapted to engage sockets for connecting the unit to the appropriate parts of the electric circuit of the apparatus. 35 The stationary central or other contact connected to the movable contact may be connected to one of these pins or may be adapted to be separately connected to the appropriate point in the circuit. 40

Dated this 9th day of December, 1947.

KILBURN & STRODE,  
Agents for the Applicant.

#### COMPLETE SPECIFICATION

#### Improvements in or relating to Apparatus for Detecting the Presence of Explosive or Toxic Gases

I, RALPH POOLE, British Subject, of 50, Bedford Square, London, W.C.1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for detecting the presence of explosive or toxic gases, that is to say, of gases which when present in a sufficient proportion in a gas under investigation produce an explosive or dangerously toxic mixture, and of the kind comprising an electric circuit containing a detecting filament arranged to be exposed to the gas under investigation and to be maintained at a temperature at which it has a catalytic action on the gas, a compensating filament and apparatus responsive to variation in the relative resistances of the two filaments resulting from variations in the temperature of the detecting filament due to its catalytic action in the presence of explosive or toxic gas.

In such apparatus, the action of the compensating filament is to ensure as far as possible that variations in the state of the gas under investigation, such as its humidity or temperature, shall not affect the operation of the apparatus and, if satisfactory results are to be ensured, it is necessary that the detecting and compensating filaments be matched so that

they will respond equally to changes in 75 the condition of the gas other than changes in the proportion of explosive or toxic gas therein.

It is therefore the practice to provide a filament unit carrying matched detecting and compensating filaments mounted in or on a single support which is arranged to be inserted as a unit into the apparatus and to be replaced by a similar unit having matched filaments if 85 and when a filament fails or otherwise requires renewal. One such arrangement is described in the specification of the present applicant's British Patent No. 567,101.

The matching of the filaments presents certain difficulties and a degree of selective assembly and even with this a perfect match is difficult to achieve, with the result that the normal present practice is to provide an approximate match within certain specified limits, the difficulty being increased by the fact that the filaments cannot be identically the same, owing to the different functions which 100 they perform.

The object of the present invention is to facilitate the provision of filament units of the kind referred to and to enable units to be more readily provided in 105 which the filaments are in effect substantially matched.

A filament unit for gas detecting

apparatus of the kind referred to according to the present invention comprises a support carrying two filaments with appropriate terminals whereby the filaments can be connected into the circuit of the detecting apparatus and an adjusting device on the support whereby the relative current flow through the two filaments can be adjusted.

5 10 Preferably the adjusting device is constructed and arranged so that when set it cannot be inadvertently moved and to this end means are preferably provided for mechanically locking the adjusting device against inadvertent movement.

15 Further, the locking is preferably of a permanent character, that is to say of a kind which could only be released by damage or destruction of the locking means. For example the adjusting device is conveniently permanently locked in its set position by uniting it to a part over which it moves as by solder.

20 Thus, with a unit according to the present invention filaments which are not 25 in themselves exactly matched can be in effect matched after assembly in the unit by appropriate positioning of the adjusting device which is preferably then locked in position to prevent any further 30 inadvertent or other adjustment.

35 Preferably the adjusting device comprises a potentiometer and one convenient construction of unit according to the invention embodying such a potentiometer is illustrated by way of example in the accompanying drawings in which,

Figure 1 is a front elevation.

Figure 2 is a side elevation, and

Figure 3 is a plan view.

40 In the construction illustrated the unit comprises a support comprising substantially cylindrical end portions A, A<sup>1</sup> formed of insulating material and spaced apart by a spacing wall A<sup>2</sup> rigidly united 45 at its opposite ends to the portions A, A<sup>1</sup>. Detecting and compensating filaments B, B<sup>1</sup> extend between terminals A<sup>3</sup> projecting from the end portions A, A<sup>1</sup> as shown 50 so that the spacing member A<sup>2</sup> forms a screen between the filaments in known manner.

55 Mounted on the end portion A is a potentiometer comprising a part annular electric resistance C with its ends electrically connected respectively to the adjacent ends of the two filaments B, B<sup>1</sup> through the appropriate terminals A<sup>3</sup>, and a movable contact C<sup>1</sup> which is carried 60 by a stationary contact C<sup>2</sup> at the centre of the end portion A and engages the resistance C. The inner end of the movable contact C<sup>1</sup> is conveniently arranged to be gripped between two nuts on the 65 stationary contact C<sup>2</sup> as indicated and

also preferably has a slot therein as indicated at C<sup>3</sup> through which solder can be applied to the resistance.

In the construction shown the end portion A<sup>1</sup> has three contact pins D connected respectively to the two adjacent filament terminals A<sup>3</sup> and to the stationary contacts C<sup>2</sup>, the latter connection being made for example by means of a conductor, not shown, extending through the spacing wall A<sup>2</sup>. The three pins D thus constitute the means for connecting the unit detachably into the circuit of the detecting apparatus. In an alternative arrangement two pins D only may be 75 provided on the end portion A<sup>1</sup> and the fixed contact C<sup>2</sup> may engage a third contact when the unit is in position in the detecting apparatus.

80 In manufacture the unit is assembled except for the locking of the movable contact C, is then connected to test apparatus for indicating when the resistance through the two filament circuits is balanced, the movable contact is then 85 moved until such balance is achieved and this contact is then locked in position first by tightening the nuts and then applying solder to the slotted end portion at C<sup>3</sup> so that such solder passes through the slot 90 and permanently unites the end to the contact C<sup>1</sup> to the resistance C in the set 95 position.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A detachable filament unit for gas detecting apparatus of the kind referred to comprising a support carrying two filaments with terminals whereby the filaments can be connected appropriately into the circuit of the detecting apparatus and an adjusting device on the support whereby the relative electrical resistance through the circuits of the two filaments can be adjusted.

2. A detachable filament unit as claimed in Claim 1, in which the adjusting device is constructed and arranged so that when set in an adjusted position it cannot be inadvertently moved.

3. A detachable filament unit as claimed in Claim 2, in which means are provided for mechanically locking the adjusting device against inadvertent movement.

4. A detachable filament unit as claimed in Claim 3, in which the adjusting device is permanently locked in its set position as by uniting the movable part of it by solder to a part over which the movable part travels during adjustment.

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5. A detachable filament unit as claimed in any one of the preceding claims, in which the unit comprises a filament support having coaxial approximately cylindrical ends with a spacing member extending between and rigidly connected to them, filaments supported by terminals carried respectively by the two cylindrical ends and lying in the space 10 between such ends, and a potentiometer comprising a part-annular resistance connected at its ends respectively to the adjacent ends of the two filaments and extending partially round the circumferential surface of one end of the support and a movable arm pivotally mounted upon a fixed contact disposed at substantially the centre of such end of

the movable support and engaging the resistance. 20

6. A detachable filament unit as claimed in Claim 5, in which the movable arm is permanently connected to the resistance by solder at its position of adjustment. 25

7. A complete detachable filament unit constructed and arranged substantially as described with reference to the accompanying drawings.

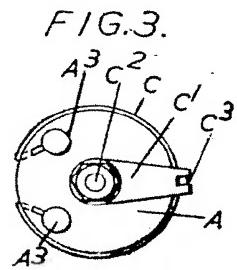
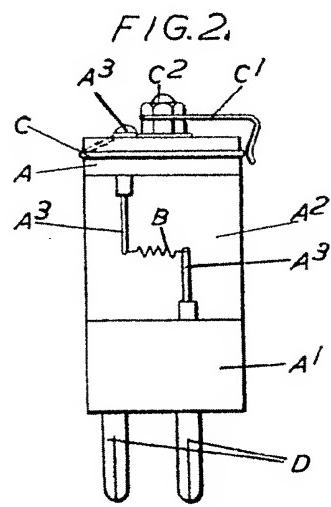
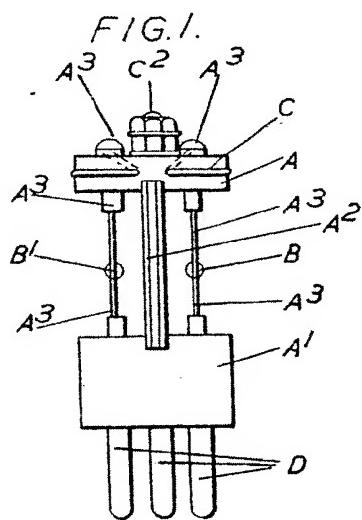
8. Gas detecting apparatus of the kind referred to including a detachable filament unit as claimed in any one of the preceding claims. 30

Dated this 7th day of January, 1949.

KILBURN & STRODE,  
Agent for the Applicant.

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H.M.S.O. (Ty.P.)

